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Number 36.

April, 1917.

FOREWORD!

IN THE TRYING TIMES WHICH THE WAR HAS BROUGHT TO THE UNITED STATES, IT SHOULD BE REMEMBERED THAT THE SUCCESS OF ANY ORGANIZATION DEPENDS WHOLLY UPON THE EFFORTS OF THE INDIVIDUALS COMPOSING THE ORGANIZATION, AND THAT THE BRANCH OF FEDERAL GOVERNMENT WHICH YOU REPRESENT INVOLVES TWO OF THE MOST IMPORTANT FACTORS AFFECTING THE WELFARE OF THE COUNTRY IN GENERAL, (1) THE RELATION OF INSECT PESTS TO THE FOOD SUPPLY AND (2) THE RELATION OF NOXIOUS INSECTS TO THE HEALTH OF MAN AND DOMESTIC ANIMALS.

THE SPLENDID SUCCESS WHICH HAS CHARACTERIZED THE EFFORTS AND ATTENDED THE WORK OF THE BUREAU OF ENTOMOLOGY IN THE PAST, MAY ONLY BE ECLIPSED BY REDOUBLED EFFORTS AND VIGILANCE UNDER STRESS OF THE EXTRAORDINARY CONDITIONS WHICH NOW CONFRONT YOU.

FEDERAL AND STATE ENTOMOLOGISTS TO COOPERATE IN PREPARING FOR THE WAR.

Under date of April 7, 1917, the Chief of the Bureau addressed the following letter to all State Entomologists:

"It is unnecessary to call attention to the important work which the entomologists of the country can do in the present crisis in the way of increasing crop production by the control of injurious insects. Without doubt you have already given careful consideration to methods whereby information may be best put before the people of your State to insure widespread adoption of measures for minimizing losses and insect attack. The Bureau of Entomology is organizing its forces to bring before the country at large, essential information of this character through brief publications and through the activities of men at various field stations. While no part of the field should be neglected, it is felt that special attention should be given to insect outbreaks involving staple crops, and to the preservation of stored grains, forage, etc. Probably in some instances it will be feasible to reduce infestation or spread by prompt measures. For this reason the entomological service of the United States as a whole should be on the lookout for unusual insect conditions, and where concerted action is essential, such cooperation should be arranged at the first possible moment.

The Bureau of Entomology wishes greatly to increase its reporting service on insect pests. We will have the cooperation of the crop reporters and farm demonstrators throughout the country and would like to have also the cooperation of all State and Station Entomologists. This service will be conducted with headquarters at Washington and it is hoped that all those assisting will keep the central office in constant touch with the status of insect pests in their vicinity. With this data in hand the central office will be able to tabulate and map the occurrence of all injurious pests and to indicate to the men in the field the sections which are threatened with insect damage and the means for combating same. With this information it will be possible to conduct a vigorous campaign against threatening pests.

The Bureau stands ready to assist State and Station Entomologists whenever it is possible to do so.

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Will you kindly write me in regard to this suggestion as fully and freely as possible.

Sincerely,
(signed) L. O. Howard, "
Chief of Bureau.

ANNUAL MEETING OF THE NATIONAL ACADEMY OF SCIENCES

The annual meeting of the National Academy of Sciences convened April 16 and adjourned April 18.

"Mr. W. V. King, of the Bureau of Entomology, introduced by Doctor L. O. Howard, presented the following paper 'Sporogony of malaria parasites', with photomicrographs of infected Anopheles."

HOW THE BUREAU OF ENTOMOLOGY IS MEETING THE GREAT ISSUE.

Immediately upon receipt of the news of the Declaration of War, the following letter was transmitted by the Chief of the Bureau, to each member of the Bureau of Entomology, both in Washington and in the Field Service:

April 7, 1917

"The crisis in which this country is placed makes it necessary for the Bureau to do all it can towards the conservation of our resources. It has been decided to establish a system of reporting local outbreaks of insects so that the Bureau will have the earliest possible information regarding unusual injury to crops. This service will receive reports on insect abundance, make tabulations, and maps, and compile statements for the use of the men in the field as to probable damage.

Will you please make it a part of your duty to report promptly through your section chief all observations on insect damage which are of more than usual intensity, and report the first occurrence of well known pests. In all cases where possible numerical estimates should be made. This work should cover all injurious insects which may come to your attention regardless of the work in which you may be regularly engaged. It is not intended, however, that this shall supplant the regular work. It should be merely incidental but at the same time carried on to as full an extent as possible without interfering with other important matters.

Very truly yours,
L. O. Howard, "
Chief of Bureau.

PAUL MARCHAL'S BOOK ON AMERICA.

It does not seem like four years since Dr. Paul Marchal visited this country and traveled from east to west and north to south, visiting the field laboratories of this Bureau and educational institutions, yet actually that trip was taken in the summer of 1913. His book, under the title (translated) Biological Sciences Applied to Agriculture and the Struggle against the Enemies of Plants in the United States, was received in this country in November last, its publication having been delayed by the war, and it is even now printed only in a very small edition. It is a large royal octavo volume covering some four hundred pages, abundantly illustrated. Marchal has a remarkable mind. It is

little less than marvelous that in two months and a half he should have grasped the whole field in so perfect a way as to be able to write a book which is especially illuminating to us who are in the middle of things and who cannot get the perspective which he reached after he returned to France and collected and classified his facts and impressions. The larger part of the book is devoted to the Bureau of Entomology, pages 52 to 193 being given to our Service. The rest of the Department is considered in the following 30 pages, and 20 more are given to the experiment stations, the state entomologists, the Horticultural Commission of California, and the forestry services of the different states. Then follow 40 pages on universities and agriculture colleges, especial space being given to Cornell University and the Universities of Illinois, California, Stanford and Harvard. He is enthusiastic over the Association of Economic Entomologists. The remaining 100 pages of the book are devoted to chapters on insect carriers of disease, the methods employed in the struggle against the enemies of crops (this chapter being divided into cultural methods, biological methods, and technical methods), the laws concerning the protection of plants, including the insecticide law, and a conclusion. In this conclusion, after praising in an unstinted way the establishments of this country and the work which has been done, he especially points out that, far from narrowing itself in applications of science, the United States holds a place of the first rank in creative science. He thinks that France has much to learn from America, although it would be a mistake in his country to create an organization imitating in all respects the Department of Agriculture at Washington. He shows that the economic cultural conditions are quite different on the two continents and that certain questions which have prime importance here have only a secondary interest in France. He is inclined to think that the United States Department of Agriculture is rather over organized, and thinks that the future will bring about a simplification of its constituent elements. The lesson that he learned by his journey is that France can no longer remain stationary in these matters and that it should make efforts to organize biology as applied to agriculture upon a large and solid basis, and he proceeds with practical suggestions in this direction. He praises the Federal Horticultural Board, the Federal Insecticide Board, and the Horticulture Commission of California, and thinks that all of these should be imitated in France. He especially points out the necessity for the introduction into France of such education as our young men get in applied biology in the agricultural colleges and universities like Cornell and Illinois. There is, as he points out, in France at the present time no way of getting a scientific education in biological studies as applied to agriculture.

After pointing out some of the great examples of monetary saving in this country as the result of work in applied biology, he closes with the sentence, "These are great examples which it is well to recall, for they established with the most complete evidence the fact that there is no other sure way than that of scientific organization of work to get full value from the national soil and to give back to agriculture the greatest possible part of the riches which are lost to it annually from pests." [L. O. H.]

WINNING OF WAR UP TO FARMER

That the final responsibility for winning the war rests in a large measure with the farmer was the conclusion of 62 state officials and representatives of agricultural colleges from 32 states, who convened at St. Louis May 9 and 10 to consider measures for the conservation of food supplies and the extension of production to protect the country against possible distress from shortage of food.

"It will fall to the United States to feed not only her own people and army but the people and armies of England and France as well," said Dean E. A. Burnett, of the college of agriculture, who with Chancellor Avery and Prof. C. W. Pugsley, director of agriculture extension, represented the University of Nebraska at this conference. "The estimated shortage of the wheat crop for this year (a two-thirds crop is predicted) coupled with Argentine's embargo on wheat will make a serious world shortage.

Increase of corn area; increase of spring wheat area in Northern states; planting of killed-out winter wheat fields with oats, corn, or sorghum; growing of more barley, beans, and potatoes; use of only reliable seed; and the conservation of breeding stock were advanced as some of the means of increasing food production. (University Farm, Lincoln, Nebraska.)

ERADICATION OF MALARIA

A publication of vital interest, especially with regard to our Southern United States and Insular possessions, entitled, "A Plea and a Plan for Eradication of Malaria Throughout the Western Hemisphere," by Frederick G. Hoffmann, Statistician of the Prudential Life Insurance Company of America, which has been received recently by the Bureau of Entomology, was read in abstract before the Southern Medical Association's 10th Annual Meeting, Atlanta, Georgia, November 14, 1916. This bulletin presents an exhaustive compilation on the causation of malaria and statistics relating to the attendant economic loss. It is illustrated by graphic charts which successfully exploit the colossal losses due to malaria throughout the world.

Members of the Bureau of Entomology may secure this publication by addressing "The Prudential Life Insurance Company of America, Newark, New Jersey."

EMERGENCY MEASURES FOR AGRICULTURE.

Dr. Beverly T. Galloway, Assistant to the Secretary of Agriculture, and in charge of the Department's emergency measures for dealing with the agricultural situation, issued the following statement April 13.

The following letter issued by the British Premier, David Lloyd George, while addressed to the people of England, conveys advice distinctly applicable to the United States and which should be heeded by every one who can do anything to produce food or save food from waste:

10, Downing Street, Whitehall, S. W.
March 5th, 1917.

"We have now reached a crisis in the war when to ensure victory, the heroism of our armies at the Front must be backed by the self-sacrifice and tireless labor of every one at home. To this end the production of each quarter of wheat and oats, and of each bushel of potatoes is of vital importance. The work of the next few weeks must decide the harvest of the year; and in the nation's interest I urge you, at whatever personal sacrifice, to overcome all obstacles, to throw your fullest energies into the work, and to influence and encourage all who assist you, so that every possible acre shall be sown.

The imperative demands of the war, have made it impossible to

avoid calling up men fit for active service, even though skilled in farming. As far as possible this is being met by bringing on to the land men and women from other industries. They cannot be expected to do work equal to that of men expert in agriculture; but there is no time for delay and the Government is confident that farmers will at once step forward and do all in their power to utilize their services to the best advantage.

The farmers of this country can defeat the German submarine and when they do so they destroy the last hope of the Prussian.

Yours faithfully,
(Signed) D. Lloyd George. "

BEEKEEPING TO OFFSET SUGAR SHORTAGE.

The first work of the office of Bee Culture Investigations in the effort to increase the food supply on account of the war is an active campaign to increase the honey crop during the coming season. During the winter, the shortage of sugar and other factors have caused an increase in the price of all grades of honey and there is every reason to expect the present prices to be maintained or even increased slightly. Since the country will need all the honey that can possibly be produced, this is an unexcelled opportunity for beekeepers to increase their business with profit to themselves, as well as to augment the food supply with a valuable food.

The work so far consists of circular letters to apiary inspectors, teachers and extension workers in beekeeping, officers of beekeepers' associations and others to enlist their assistance in the campaign. Several of these workers have already begun to assist actively in the work. Circular letters are being sent to all county agricultural agents for distribution and a letter has also been sent to 9000 honey crop reporters of the Bureau of Crop Estimates. As rapidly as possible circular letters are being sent to individual beekeepers in the chief producing centers. Obviously plans for increasing apiaries and enlarging production must be made before about June 1 in all parts of the country and this makes immediate action necessary. With present prices to encourage beekeeping, together with the patriotic incentive, it is hoped that the crop may be increased at least 25% over the unusually large crop of 1916. In addition to the more personal appeals, press notices and similar material have been issued.

As soon as this early work is completed, concise information will be sent out widely on the best manipulations for increasing the crop and this will be followed by a campaign to prevent the usual winter loss of over 10% of all colonies. [E. F. Phillips.]

A POINT ABOUT PACKING INSECTS FOR SHIPMENT.

Frequently Schmitt boxes containing insects are shipped by being placed unwrapped in excelsior. In such cases dust is likely to make its way into the boxes and lodge on the specimens. In an instance which has recently come to attention, a large number of specimens were injured to a considerable extent in this way. It is therefore well in all cases to wrap Schmitt boxes in paper before they are placed in excelsior or other packing material.

VISITORS TO THE BUREAU OF ENTOMOLOGY DURING APRIL.

Prof. J. Chester Bradley, Systematic Entomologist, Cornell University, Ithaca, New York.

Mr. R. C. Shannon, Cornell University, Ithaca, New York.

Prof. James G. Sanders, the Economic Zoologist, Harrisburg, Pennsylvania.
Prof. W. L. Chandler, Instructor in Entomology and Parasitologist of Cornell University, Ithaca, New York.
Dr. J. R. de la Torre-Bueno, the Hemipterist of New York.
Prof. A. B. Cordley, Director of the Experiment Station, Corvallis, Washington.
Dr. T. J. Headlee, New Jersey State Entomologist.
Mr. J. R. Malloch, University of Illinois.
Mr. W. C. O'Kane, New Hampshire State Entomologist.

ENTOMOLOGY PUBLICATIONS ISSUED DURING APRIL.

YEARBOOK SEPARATE 706. Suppression of the gipsy and brown-tail moth and its relation to States not infested. A. F. Burgess. 10 pages; 10 plates.

FARMERS' BULLETIN 804. Aphids injurious to orchard fruits, currants, gooseberry and grape. A. L. Quaintance and A. C. Baker. 42 pages; 31 figures.

DEPARTMENT BULLETIN 484. Control of the gipsy moth by forest management, G. E. Clement & Willis Munro. 101 pages.

ENTOMOLOGICAL CONTRIBUTION TO JOURNAL AGRICULTURE RESEARCH NOT ORIGINATING IN THE BUREAU OF ENTOMOLOGY.

The wheat-sheath miner, by H. L. Seamans. Mont. Agr. Expr. Stat. Issued Apr. 2, 1917. Key No-Mont. 5.

LIBRARY

Miss Mabel Colcord, Librarian.

NEW BOOKS.

Bailey, L. H. The standard cyclopedia of horticulture. v. 6. S - Z. N. Y., The Macmillan Company, 1917. p. 3043-3639. Illus., col. pl.
This volume completes the new edition of this great work.

Barnes, J. H. The insects attacking stored wheat in the Punjab and the methods of combatting them... by J. H. Barnes and A. J. Grove. Calcutta & London, 1916. 165-280p. illus., pl. (India. Dept. of agriculture. Memoirs. Chemical series. v.IV, no. 6)

British museum (Natural history) Guide to the specimens and enlarged models of insects and ticks exhibited in the Central hall, illustrating their importance in the spread of disease. London, 1916. 44p. illus. (Special guide no. 7)

Cleland, J. B. Further investigations of worm nests in cattle due to *Onchocerca gibsoni*. No. 2. By J. B. Cleland, Sidney Dodd and Eustace W. Ferguson. Melbourne, 1917 (?) 41p.

Egypt. Dept. of agriculture. ... Report on the great invasion of locusts in Egypt in 1915 and the measures adopted to deal with it. Cairo, 1916. 72p. 14 pl. diagrs.

- Fabre, J. H. Life of the grasshopper. N. Y., 1917. 453p. Translated by Alexander Teixeira de Mattos.
- Hesler, L. R. and Wetzel, H. H. Manual of fruit diseases. N. Y. 1917. 462p.
- Keleher, T. A. The culture of the mulberry silkworm. Washington, D. C., 1917. 13p.
- Massachusetts State Forester. Thirteenth annual report [by Frank W. Rane] 1916. Boston, 1917. 124p., 6pl. (Public document No. 73)
- Morgan, T. H. A critique of the theory of evolution. Princeton, 1916. 197p. illus.
- Official congressional directory, 65th Congress, 1st Session, beginning April 2, 1917. 436p.
- Report on agriculture experiment stations and cooperative agricultural extension work in the United States for the year ended June 30, 1915. Washington, 1916. 321+364p.
- Part I. Report on the work and expenditures of the agricultural experiment stations, 1915.
- Part II. A report on the receipts, expenditures and results of cooperative extension work in agricultural and home economics in the United States, 1915.
- Tennessee Dept. of agriculture. Biennial report 1915-1916.
- Page 47-52 Report of the State entomologist and plant pathologist, G. M. Bentley.
- Page 53-55 Report of the State apiarist and Inspector of apiaries, J. S. Ward.

BEE CULTURE.

E. F. Phillips, In Charge.

Geo. H. Rea, Agent and Specialist in Beekeeping in North Carolina, resigned April 11th to accept the position of Beekeeping Adviser in the Office of Economic Zoologist of Pennsylvania.

Kennith Hawkins spent most of April in Texas and Oklahoma attending a series of beekeepers' meetings arranged by the State Entomologist and the Extension Director of Texas. Mr. Hawkins will go to Virginia to begin extension work in beekeeping early in May.

C. E. Bartholomew spent two weeks in April on a special bee and poultry train, arranged by the N. C. and St. L. R. R.

Geo. S. Demuth returned April 20 from an extended trip through Washington, Oregon, Idaho and Colorado.

G. H. Cale, recently appointed to take charge of the beekeeping work at the Maryland State College of Agriculture, spent several days at the office recently for the purpose of utilizing the lists of Maryland beekeepers on file in

the office in sending out circular letters on increasing the honey crop this season.

At the present time beekeeping is taught in the agricultural colleges in 22 States. In all but one or two cases this work has been inaugurated within the past five years. In ten of these colleges, the work occupies the exclusive attention of at least one instructor.

In 1906, when Entomology Bulletin No. 61 was issued, there were laws in twelve States providing for the inspection of apiaries. Most of these laws have been since replaced by more effective ones. At present there are such laws in 29 States and, in addition, Hawaii and Porto Rico have regulations to prevent the introduction of bee diseases. In all there are about 100 apiary inspectors in the United States. Thirty-four States now have State associations of beekeepers and five have associations for marketing honey. In addition to these there are now many county associations.

DECIDUOUS FRUIT INSECT INVESTIGATIONS.

A. L. Quaintance, In Charge.

B. R. Leach, who has been in Washington preparing manuscript and notes on the results of his investigations of the woolly apple aphid, has returned to his permanent headquarters at Winchester, Va., where he will resume his field duties in connection with apple insect investigations.

A. J. Ackerman, formerly engaged in nursery insect investigations at West Chester, Pa., has been transferred to the Bureau's laboratory at Benton Harbor, Mich., where he will assist Mr. F. L. Simanton in connection with orchard insecticide investigations.

Edwin R. Selkregg, who has been employed temporarily on different occasions in connection with deciduous fruit insect investigations, has now been appointed as Scientific Assistant, and will assist in experimental work against the oriental peach moth at Arlington Farm, Va.

A. J. Flebut, who has been engaged in investigations of chestnut weevils and other nut insects in the East, is now undertaking experimental work with these insects at his permanent headquarters, Paxinos, Pa.

FEDERAL HORTICULTURE BOARD.

C. L. Marlatt, Chairman.

The hearing held April 10, on the subject of the White Pine Blister Rust, has resulted in the issuance of two quarantines effective June 1. The first of these is a domestic quarantine, and prohibits the movement of five-leaved pines, and currant and gooseberry plants, from the eastern half of the United States, west of the line formed by the western boundaries of the States of Minnesota, Iowa, Missouri, Arkansas, and Louisiana, with the object of protecting the great pine forests of the Rocky Mountain and Pacific Coast States. There is a further prohibition of the movement of the five-leaved pines and black currant plants from the New England States, and New York, to the States lying between these States and the western line of the general quarantine, for the purpose of protecting these intermediate states from possible infection by white pine blister rust, by means of the plants named, from the rather heavily infected New England States and New York. The foreign quarantine prohibits the further entry of gooseberry and currant plants from Europe and Asia, and completes the protect-

ion against further introductions from this source.

A hearing has been called for May 8, on account of citrus canker. It is proposed to discuss the advisability of prohibiting the further entry of citrus fruits from Oriental regions known to be infected with canker, to supplement the existing quarantine which prohibits the entry of citrus plants from all foreign countries.

Provision has also been made for the entry of Oriental corn from all of the countries covered by the corn quarantine under regulations requiring inspection and steam sterilization. This Oriental corn is needed on the Pacific Coast chiefly for chicken feed in which there is a great shortage. The resulting high prices have stimulated importations from countries like Australia, which have never heretofore been a source of corn supply.

Mr. Busck, whose trip to Mexico was announced in the last number, reports that Villista activities in the Region of Torreon have prevented his making field inspections in the Laguna District. This situation is unfortunate, but the danger was evidenced by numerous outrages and attacks on trains, and attempts fairly successful to blow up some of these. In the meantime however, he has been able to secure material for examination from the infected district, and to consult with a good many ranch owners, and has thus accumulated information which will be of great value to the Department in relation to the pink boll worm quarantine.

Mr. R. I. Smith, the inspector in charge of the Boston Office, was in Washington for a few days to consult on his work.

Mr. James A. Dew, who pursued a course in general agriculture and took entomology as a special study at Clemson College in 1909-1911, and, who was later employed as Assistant State Entomologist in Alabama, and who until very recently had charge of the citrus canker eradication work in Georgia and South Carolina in cooperation with the Bureau of Plant Industry of this Department, has accepted an appointment under the Federal Horticultural Board and has been stationed as the Board's Inspector at Eagle Pass in connection with the pink boll worm quarantine. At this time Eagle Pass is the principal danger point from Mexico, and all freight and other cars receive careful examination, and all transfers of goods are thoroughly safeguarded under Mr. Dew's direction.

FOREST ENTOMOLOGY.

A. D. Hopkins, In Charge.

Carl Heinrich spent about a week in Ithaca and New York City examining types of Forest Lepidoptera in the collections of Cornell University and the American Museum of Natural History.

F. C. Craighead is spending several days in Wilmington, North Carolina and Atlanta, Georgia investigating *Prionus* and *Romaleum* injury to oak shade trees there.

Notes from the Eastern Field Station

Falls Church, Virginia.

The American tent caterpillar (*Malacosoma americana*) will be very

abundant around Falls Church this year; the larvae have hatched and have spun small webs which are very conspicuous in the trees. As many as 25 tents have been counted in one small tree. There is hardly a wild cherry tree in this vicinity that does not have a great many tents. While the tents were still small we had a few days of surprisingly low temperature, the thermometer going as low as 27°F., but an examination of the tents after this cold weather showed that practically all of the larvae were alive. Examinations made during the cold spell showed that none of the larvae were feeding but all congregated within the tent.

Mr. J. Kotinsky reports similar conditions in wild cherry in Rock Creek Park, D. C.

SOUTHERN FIELD CROP INSECT INVESTIGATIONS

W. D. Hunter, In Charge.

G. A. Runner visited Washington on April 20.

D. L. VanDine spent a few days in Washington during the month.

The recent examination for cotton entomologists was taken by sixty-one persons.

TRUCK CROP AND STORED PRODUCT INSECT INVESTIGATIONS

F. H. Chittenden, In Charge.

Frank R. Cole, Scientific Assistant, formerly located at Washington, D. C., is detailed to Hood River, Ore., to investigate insects injurious to strawberries and other truck crops in cooperation with the Oregon Agricultural Experiment Station at Corvallis.

C. H. Popenoe, Entomological Assistant, attended the meeting of entomologists and plant pathologists at Pittsburgh, Pa. April 16-17 to discuss plans for cooperation with the H. J. Heinz Co. and State officials on the project of insects as carriers of cucurbit wilt and other diseases of truck crops.

N. F. Howard, Expert in Insects as Carriers of Plant Diseases, was in attendance at Pittsburgh at the same meeting. He will continue work at the Madison, Wis., station in cooperation with the Department of Agriculture of the University of Wisconsin.

C. E. Smith, Scientific Assistant, Baton Rouge, La., has been reengaged to work on truck crop insects, including insects as carriers of truck diseases at Muscatine, Iowa.

H. L. Weatherly for some years assistant to H. O. Marsh at Rocky Ford, Colo., will resume his work there for the same purpose.

CEREAL AND FORAGE INSECT INVESTIGATIONS

W. R. Walton, In Charge.

The following appointments have been made in the field service of the branch of Cereal and Forage Insect Investigations during the past few weeks: Merton C. Lane, detailed to assist at the field laboratory located at Forest Grove, Oregon:

Herman J. Hart, assigned to the Wellington, Kansas, field station:

Dean A. Ricker, appointed to the field laboratory located at West La Fayette, Indiana.

NOTES FROM THE FOREST GROVE (OREGON) FIELD STATION.

A letter from C. W. Greel in charge of the entomological field station at Forest Grove, Oregon, states that the spring season in the Pacific Northwest is a backward one. Examination of cocoons of the clover-flower midge reveals the fact that none of the larvae have as yet begun to pupate. Normally at this date a large percentage of the midge is in the pupa stage.

The clover-root borer has not yet begun to fly, although it was flying last year on April 7th.

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